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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

JELSMA, JONATHAN G

ART UNIT

PAPER NUMBER

1795

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/518,345	Applicant(s) WATANABE ET AL.	
	Examiner Jonathan Jelsma	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 September 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7,9 and 10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 September 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>08/15/2008, 09/24/2008</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Summary

1. This is the second office action based on application 10/518,345 and in response to applicant's arguments/remarks filed on 09/08/2008.
2. In the amendment claims 1-7, and 9-10 were amended, and claim 8 was canceled, claims 11-28 are previously restricted. All amendments have been entered. Claims 1-7 and 9-10 are currently pending and have been fully considered.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:
 1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. Claims 1-3, 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over GUCKEL (US 5,866,281) in view of SUWA (US 2001/0021546 A1).

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6. GUCKEL teaches a mask comprising a thick film, the silicon wafer (47) which supports the main exposure film (102) (column 13 lines 55-58, and column 15 lines 59-61). The thin film for exposure is made of an x-ray blocking material (column 15 lines 53-55). The exposure pattern is formed by developing away the non-transmitting areas, creating apertures for the transmissive portion (column 14 lines 45-63, see figures 11, 15 and 16).

7. GUCKEL does not explicitly teach having a thin film for inspection formed at a distance from the exposure area.

8. However, SUWA teaches a mask with a circuit pattern and an inspection pattern on the same mask (paragraph 0011). This inspection pattern may be formed in a separate area to the circuit pattern, and would be in the same layer material so that the thickness and material for the inspection pattern and the exposure pattern will be the same (paragraph 0016).

9. At the time of the invention one having ordinary skill in the art would have been motivated to add the inspection region of SUWA to the mask of GUCKEL in order to measure the line width of the pattern and eliminate the time required for mask exchange by having the inspection pattern on the same mask (SUWA paragraphs 0010-0011).

10. Further neither GUCKEL nor SUWA explicitly teach a first vulnerable area to pattern damage in the exposure patter, and a second higher vulnerable area in the inspection region.

11. However, at the time of the invention one having ordinary skill in the art would recognize that all pattern areas would have vulnerable areas to pattern damage

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inherently. Further one having ordinary skill in the art would recognize that since SUWA teaches using the inspection pattern to measure attributes of the exposure pattern, prior to the exposure of the pattern, that by having the higher probability in pattern damage in the inspection pattern, which would be determined before the exposure of the main pattern, would have been obvious because SUWA teaches the measurement, and therefore detection of damage prior to the exposure of the main pattern region (paragraph 0030), prior to the damage showing up in the main field region. The alteration of the line width and density of the inspection pattern in order to achieve the desired inspection pattern would have been obvious as discussed above.

12. Claims 4-5 is rejected under 35 U.S.C. 103(a) as being unpatentable over GUCKEL (US 5,866,281) in view of SUWA (US 2001/0021546 A1), as applied to claims 1-3 and 6-7, 9-10 above, and further in view of SUZUKI (US 6,768,124 B2).

13. Claim 4 is dependent upon claim 1, which is rejected above in view of GUCKEL and SUWA under 35 U.S.C. 103(a). Neither GUCKEL nor SUWA explicitly teaches that the non-transmission portion comprises a beam scatterer for exposure formed on thin film.

14. However, SUZUKI teaches a membrane with scatters electrons during electron beam exposure (column 10 lines 18-33).

15. At the time of the invention one having ordinary skill in the art would have been motivated to use the electron beam scattering membrane of SUZUKI in the mask of

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GUCKEL and SUWA in order to pattern using an electron beam exposure apparatus to pattern a resist (SUZUKI column 10 lines 28-33).

16. Claim 5 is dependent upon claim 1 which is rejected above in view of GUCKEL and SUWA under 35 U.S.C. 103(a). GUCKEL teaches using alignment marks to precisely align x-ray masks with a previously patterned photoresist layer (column 4 lines 17-22). Additionally SUWA teaches that there may be a plurality of inspection patterns (paragraph 0012). See also figure 15A which shows a plurality of inspection patterns.

17. However, neither GUCKEL nor SUWA explicitly teaches that the portion for exposure is a pattern repeated plurality of times corresponding to the number of individual patterned devices the mask is intended to form.

18. SUZUKI teaches that the reticle with a pattern defining region may comprise subfields, 44, which define respective portions of the pattern, or alternatively that the reticle can have multiple pattern defining regions, 53a and 53b each defining respective major portion of the pattern (column 11 lines 10-17).

19. At the time of the invention one having ordinary skill in the art would have been motivated to use a mask pattern with the subpattern defining regions which define the portions of the semiconductor device as taught by SUZUKI in the mask of GUCKEL, based on the limitations of the exposure system being used, for example the charged particle beam (SUZUKI abstract).

20. Further, neither GUCKEL nor SUWA explicitly teaches that the area of the thin film for inspection is larger than the thin film for exposure, or that the flexure of the thin film for inspection is bigger than that of the thin film for exposure. Further neither

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GUCKEL nor SUWA explicitly teach that the thin film for inspection has a transmission portion with line width and density different from each other.

21. However, SUWA does teach that since the inspection pattern is formed in a separate area than the circuit, or exposure pattern, the shape and position of the inspection pattern may be flexibly designed (paragraph 0016). Further SUWA teaches that the inspection pattern comprises of a first linear pattern with one line width and a second linear pattern with a different line width (paragraph 0026). And that the measurement of this line width of this inspection pattern is used to determine with high accuracy the line width of the main circuit, or exposure pattern (paragraph 0025).

22. Therefore, at the time of the invention one having ordinary skill in the art would have been motivated to alter the line width and density , and even the flexure of the inspection patter as a matter of routine experimentation in order to have a pattern which accurately represents the main exposure pattern.

Response to Arguments

23. Applicant's arguments, see applicant's arguments/remarks page 5 second paragraph, filed 09/08/2008, with respect to objection to the drawings have been fully considered and are persuasive. The objection of Figures 1-3 has been withdrawn. The newly submitted drawings with the prior art label has overcome the objection to the drawings.

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24. Applicant's arguments, see applicant's arguments/remarks page 5 fourth paragraph, filed 09/08/2008, with respect to objection to the claims have been fully considered and are persuasive. The objection of claims 2 and 6-7 has been withdrawn. The amendments to the claims have overcome the objections.

25. Applicant's arguments, see applicant's arguments/remarks page 5 fifth paragraph, filed 09/08/2008, with respect to 35 U.S.C. 112 rejection to the claims have been fully considered and are persuasive. The 35 U.S.C. 112 rejection of claims 3-4 and 8-10 has been withdrawn. The amendments to the claims have overcome the rejection.

26. Applicant's arguments filed 09/08/2008 have been fully considered but they are not persuasive. Specifically on page 5, 7th paragraph, applicant argues that the cited reference do not disclose a first thin film portion for exposure which comprises a first vulnerable sub-portion that has a highest probability of pattern damage within the first thin film portion for exposure, and that the second thin film portion for inspection comprises a second vulnerable sub portion that has a highest probability of pattern damage within the second thin film portion for exposure, such that the second vulnerable sub-portion has a higher probability of pattern damage than the first vulnerable sub-portion. Additionally applicant states in page 6, second paragraph, that the advantage of the present technology is to allow for the prediction of pattern damage

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by monitoring only the inspection pattern, in order to avoid the use of an exposure mask prior to the failure during actual process use. This argument is not persuasive.

27. Similarly using the method of SUWA the line width is measured first in a separate area of the circuit pattern, and the measurement pattern is flexibly designed (paragraph 0016). The measurement pattern may correspond to the line width of the circuit pattern, and is capable of measuring even the smallest line width of the fine circuit pattern (paragraph 0018). An additional benefit of SUWA is that by measuring the line width prior to the exposure, the optimal exposure conditions may be determined (paragraph 0030). Therefore, SUWA teaches the measurement, which would inherently determine if the pattern is damaged, prior to the exposure of the main mask design. Additionally the measurement of the in section pattern is done at a lower intensity than the exposure (paragraph 0065). In combination with the patterns being projected in overlapping groups for determining the measurements (paragraph 0068) indicates that the pattern of SUWA would have increase sensitivity to any pattern damage. Therefore, the combination of the overlapping measurement patterns, which increase the complexity and the lower exposure dose, means that the inspection pattern of SUWA would be more susceptible to pattern damage than the main pattern region.

Conclusion

28. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

29. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Jelsma whose telephone number is (571)270-5127. The examiner can normally be reached on Monday to Thursday 7:00 a.m. - 5:00 p.m.

31. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571)272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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32. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark F. Huff/

Supervisory Patent Examiner, Art Unit 1795

JGJ